Check 10. The general components of enterprise.pdf

by Arta Sundjaja

Submission date: 12-Sep-2019 11:00AM (UTC+0700)
Submission ID: 1102516845
File name: 10._The_general_components_of_enterprise.pdf (774.39K)
Word count: 4618
Character count: 26921

The General Components of Enterprise Architecture Framework in e-Commerce: A Systematic Literature Review

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***Abstract*—online transaction has been booming in this era, there are so many customers use this method for buying some product through electronic media. Implementation model of enterprise architecture framework in e-commerce usually work successfully, but in some enterprise since the model of enterprise architecture has been applied, companies seeing the lack of alignment between business and technology designed, so companies need to find solutions for fixing the problems. One of the purposes of this literature review is to analyze the components of enterprise architecture framework to support business processes with technology of e-commerce system. This study uses a systematic literature review method, step of search process reviewing various sources of databases by using keywords related to the topic of research, and the data obtained is classified based on the inclusion and exclusion criteria. There are 117 papers identified with the topic research, then selected into 50 papers to review. The research result finds six component of enterprise architecture framework is the most influential in the development of e-commerce systems, which are business, system, design, technology, service, and people.**

***Keywords*—component; enterprise architecture framework, e-commerce, systematic literature review.**

I. INTRODUCTION

Technology and communication are evolved in this era, which is an online transaction using electronic media that referred e-commerce. This business is continuously developed by each company to get a benefit greatly, and this business model is also highly impact demand by customers to make a transaction because it can be doing in anywhere and anytime without spending the time for coming to physical store to buy a goods. For enterprises is very interesting for them to build an e-commerce system that bridges customer transaction activity to buy a product easily and safely. Enterprises develop their business by offering a number of facilities and services for customers in online transaction, starting from the implementation of the architecture framework on e-commerce system till the next development stage [31]. In most companies, since the enterprise architecture framework applied in the system of e-commerce, companies seeing that isn't quite make the alignment between business develop by those with technology in the enterprise [1]. Therefore, companies need to find solutions to overcome their problems.

The purposes of this research were to serve three goals. First, was to analyze some components of enterprise architecture framework in e-commerce. Second, was for understanding the definition of components enterprise architecture framework in e-commerce. Third, the research would give information about the most components of architecture framework currently used in e-commerce. This literature review was to answer the question of what are components of enterprise architecture framework in e-commerce?

II. THEORETICAL BACKGROUND

A. *Enteprise Architecture Framework*

Enterprise Architecture is an architectural model of the company to support the business processes of existing system at the company. Enterprise architecture framework consist of a set models, principles, and method that are used organization to implement enterprise architecture, then the framework provide a relationship between artifact of architecture and planning process, also guidelines to measure all of steps ongoing with a good condition [5].

B. *E-commerce*

One of reason from history of e-commerce came from issue transformation of economic activities, there any interaction between technology and business process to be

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a key for economic transaction using online system [4]. So that e-commerce is known as an electronic commerce that use of communications networks, computers, and the internet to conduct business processes to buy and sell a product [3].

III. RESEARCH METHOD

This research using systematic literature review method [2] to identified components of enterprise architecture framework.

A. Search Process

1) *Sources:*
   - IEEE Digital Library (http://ieeexplore.ieee.org),
   - ACM Digital Library (dl.acm.org),
   - AIS Electronic Library (aisel.aisnet.org),
   - Emerald Insight (www.emeraldinsight.com),
   - Wiley Online Library (onlinelibrary.wiley.com),
   - Springer (link.springer.com),
   - Taylor and Francis (http://www.tandfonline.com).
2) *Keywords:* Enterprise architecture for e-commerce, architecture framework or enterprise architecture, e-commerce and architecture framework, enterprise architecture framework model, and enterprise architecture framework in e-commerce.
3) *Search string:* Enterprise Architecture Framework AND E-commerce, "Architecture Framework" AND E-commerce, "Electronic Commerce" AND Enterprise Architecture, "Electronic Commerce" AND "Architecture Framework", Architecture Framework OR Model AND E-commerce, Electronic Commerce OR E-commerce AND Enterprise Architecture Framework OR Model.

B. Inclusion and Exclusion Criteria

In this phase, the data found from the search process will be classified an inclusion criteria of this study, and will be executed based on exclusion criteria.

1) *Inclusion criteria*: studies must in main topic area; studies must relevant with research questions; studies that describes components of architecture framework in e-commerce; studies that describes implementation assessment of the enterprise architecture framework; academic journal or conference or book only; papers based on systematic literature method, meta-analysis (MA), descriptive analysis, qualitative, or quantitative analysis; papers consist of authors name, their institution, and the country of institution.
2) *Exclusion criteria*: papers discussing the procedures used to build an e-commerce system; papers that focusing only on the technical aspects of architecture framework; paper that showing duplicate reports of the same study; and papers based on opinion, editorial paper, thesis, panel discussions, paper redundancy.

C. Data Extraction

In this phase, the data found from search process will be extracted based on three steps in data collection, which are:

1. Studies found: paper match with search process.
2. Candidate Studies: paper collect based on title and abstract.
3. Selected Studies: paper read carefully start from introduction, analysis results, and the conclusions for helping the answer of research question.

TABLE I. DATA EXTRACTION

Source	Found	Candidate	Selected
IEEE Digital Library	20	18	14
ACM Digital Library	23	11	9
AIS Electronic Library	21	14	8
Emerald Insight	15	7	2
Wiley Online Library	11	6	4
Springer	12	7	6
Elsevier	10	8	6
Taylor and Francis	5	3	1
Total	**117**	**74**	**50**

IV. RESULT AND DISCUSSION

The selected study has been extracted based on the inclusion criteria, the next step of systematic literature review method are analysis of the result based on demographics trends and characteristics, then findings and final results.

A. Publishing Outlets

Based on Table II, there are 50 study that are published about this topic, consist of 17 journals, 24 proceedings, and 9 book chapter.

TABLE II. LIST OF STUDY

Id	Title	Source	Type	#	%
S1	An Enterprise… [6]	Springer	Journal	5	10 %
S2	TOGAF…[7]				
S3	B2B…[8]				
S4	Enterprise…[9]				
S5	A pluggable… [10]				
S6	Enterprise…[11]	Wiley	Journal	3	6%
S7	Towards…[12]				
S8	Enterprise…[13]				
S9	A classification…[14]	IEEE	Journal	1	2%
S10	Smart…[15]	IEEE	Proceeding	1	2%
S11	Analysis…[16]	IEEE	Journal	1	2%
S12	Collective…[17]	IEEE	Proceeding	2	4%
S13	A Comparative…[18]				
S14	A Comparison…[19]	IEEE	Journal	1	2%
S15	Designing…[20]	IEEE	Proceeding	1	2%
S16	Enterprise…[21]	Springer	Book	1	2%
S17	EAF2…[22]	IEEE	Proceeding	1	2%
S18	Extending…[23]	IEEE	Journal	1	2%
S19	Multi…[24]	IEEE	Proceeding	2	4%
S20	Employing…[25]				
S21	The Zachman…[26]	IEEE	Book	1	2%
S22	Developing…[27]	Emerald	Journal	2	4%
S23	A framework…[28]				
S24	A framework…[29]	Elsevier	Book	5	10 %
S25	An ontology…[30]				
S26	A systematic…[31]				
S27	Social…[32]				
S28	Exploring…[33]				
S29	A conceptual…[34]	AIS	Proceeding	8	16 %
S30	Conceptualizing…[35]				
S31	An Enterprise…[36]				
S32	The Role…[37]				

Id	Title	Source	Type	#	%
S33	Developing…[38]				
S34	E-Commerce…[39]				
S35	Architecture…[40]				
S36	Enterprise…[41]				
S37	A Role…[42]				
S38	E-commerce…[43]	ACM	Proceeding	3	6%
S39	Analysis…[44]				
S40	Component…[45]	ACM	Journal	1	2%
S41	M-Modeler…[46]	ACM	Proceeding	2	4%
S42	A Method…[47]				
S43	Ithe Business I [48]	ACM	Book	1	2%
S44	Evaluation…[49]	ACM	Proceeding	3	6%
S45	Propositions…[50]				
S46	Social…51]	IEEE			
S47	e-Commerce…[52]	Elsevier	Book	1	2%
S48	Online…[53]	IEEE	Proceeding	1	2%
S49	E-Commerce…[54]	Wiley			
S50	Framework…[55]	Taylor & Francis	Journal	2	4%
Total				**50**	

B. *Most Productive Institutions*

The most productive institution come from University of South Africa (7 authors), University of Camerino (5 authors), University of British Columbia (5 authors), and Pohang University (5 authors).

TABLE III. PRODUCTIVE INSTITUTION

Institution	Country	#Authors	%
University of Technology	Australia	2	2%
University of Rostock	Germany	2	2%
Technische Universität Ilmenau	Germany	1	1%
University of Twente	Netherland	4	3%
National Research University	Russia	1	1%
University of Tennessee	United State	1	1%
Washington and Lee University	United State	2	2%
Auburn University	United State	1	1%
University of Wisconsin-Whitewater	United State	1	1%
University of Dayton	United State	1	1%
National Institute of Standards and Technologie	United State	2	2%
Royal Institute of Technology	Sweden	1	1%
Northwestern University	United State	2	2%
University of South Africa	South Africa	7	6%
CSIR Meraka Institute	South Africa	2	2%
University of Camerino	Italy	5	4%
Hebei University of Engineering	China	4	2%
Michigan University	United State	4	3%
Ajou University	Korea	3	2%
Ar-Raniry Islamic State University	Indonesia	1	1%
Bandung Institute of Technology	Indonesia	1	1%
Universität Koblenz Landau	United State	3	2%
University of Athens	Greece	3	2%
University of British Columbia	United State	5	4%
Western Michigan University	United State	4	1%
Addis Ababa University	Ethiopia	1	1%
University of Cape Town	South Africa	1	1%
Iran University of Science and Technology	Iran	3	2%
Clarkson University	United State	1	1%
Rensselaer Polytechnic Institute	United State	1	1%
Qaboos University	Saudi Arabia	1	1%
Pohang University	Korea	5	4%
Universiti Teknologi Malaysia	Malaysia	4	3%
University of Malaya	Malaysia	2	2%
University of Maryland Baltimore County	United State	4	3%
Syracuse University	United State	1	1%
University of Applied Sciences Switzerland	Swiss	2	2%
University of Pretoria	South Africa	2	2%
University of Ottawa	Canada	3	2%
RMIT University	Australia	2	2%
CQUniversity Melbourne	Australia	2	2%
Boston University	United State	4	3%
University of the South Pacific Suva	Fiji	2	2%
Edith Cowan University	Australia	2	2%
Asian Institute of Technology	Thailand	3	2%
Carnegie Mellon University	Australia	1	1%
University of Nebraska-Lincoln	United State	1	1%
FernUniversitaet	Germany	2	2%
Technical University of Lisbon	Portugal	3	2%
Multimedia University	Malaysia	3	2%
Instituto Tecnológico de Estudios	Mexico	3	2%
University of Regensburg	Germany	2	2%
Total	22	**124**	

C. *Author Academic Background*

Based on Table IV, it was can conclude the most author academic background for these research topic from information system background, that is 57%.

TABLE IV. AUTHOR ACADEMIC BACKGROUND

Academic Background of Author	#	%
Information System	71	57%
Computer Science	24	19%
Engineering	15	13%
Business Management	9	7%
Mathematical Science	4	3%
Health	1	1%
Total	**124**	

D. *Publication Trends*

Based on Table V, 66% trend of publication come from an information system as the topic in this research, and that study in year of publication is still new, from 2000-2016.

TABLE V. PUBLICATION TRENDS

Topic	Year	#Paper	%
Information System	2011;2000;2004;2006;2014; 2015;2005;2016;2013; 2001;2010; 2009; 2003	33	66%
Computer Science	2009; 2004; 2010; 2000; 2002; 2015; 2013	7	14%
Business Information Management	2006; 1978; 2009; 2008; 2003; 2002; 1992; 2010;	8	16%
Electrical Engineering	2009;	2	4%

Topic	Year	#Paper	%
and Technology			
Total		**50**	

E. *University Affiliation According to Country*

Based on Table VI, the most productive affiliation of this topic come from United State consist of 12 papers and 31 authors, then Germany with 7 papers and 17 authors.

TABLE VI. UNIVERSITY AFFILIATION ACCORDING TO COUNTRY

Country	#Papers	%	#Authors	%
United State	12	30%	31	25%
Africa	2	2%	9	7%
Swiss	2	4%	2	2%
Canada	2	4%	3	2%
Indonesia	2	2%	2	2%
Italy	2	4%	5	4%
Iran	1	2%	3	2%
Thailand	1	2%	3	2%
Australia	2	6%	8	3%
Germany	7	17%	17	14%
Russia	1	2%	2	2%
Ethiopia	1	2%	1	1%
Netherland	1	2%	4	3%
Sweden	1	2%	1	1%
Mexico	1	2%	3	2%
Korea	2	4%	8	6%
Portugal	2	4%	5	4%
Malaysia	2	4%	6	5%
Fiji	1	2%	2	2%
Saudi Arabia	1	2%	1	1%
China	1	2%	4	3%
Greece	1	2%	4	3%
Total: **22**	**50**		**124**	

F. *Research Industries and Countries*

Based on Table VII, this topic can be implemented in various industry, which are education industry, information technology industry, and general industry, although this topic especially for specific industry.

TABLE VII. RESEARCH INDUSTRIES AND COUNTRIES

Industry	Country	Id	#	%
Education Industry	Australia; Germany; China; Iran; Fiji; United State	S1; S4; S16; S11;S18;S22 S31;S40;S43	9	18%
Information Technology Industry	Netherland; Ethiopia; United State; Saudi Arabia, Greece; Australia; Thailand; Germany; Netherlands; Portugal; Korea; Indonesia; Greece; Sweden; Italy; Malaysia; Swiss; Canada; Africa; Russia; Portugal; Mexico;	S5;S6;S50; S9;S49;S5; S2;S3;S37; S10;S12;S13 S15;S19;S2; S6;S48;S2 S25;S26;S27 S28;S47;S29 S30;S32;S33 S36;S38;S39 S41; S44	32	64%
General	United State; Germany; Portugal; Africa	S8; S14;S17; S21;S23;S34 S35;S42;S45	9	18%
Total			**50**	

G. *Findings and Final Results*

All selected study have been identifying components of enterprise architecture framework in e-commerce into 15 components (Table VIII) complete with their definitions, and also doing mapping components with selected study (Table IX).

TABLE VIII. IDENTIFIED ENTERPRISE ARCHITECTURE COMPONENTS

Components	Definition
Business	Target and strategy of business, specific business, and business must show the principles of business, vision and mission, business goal, business value and drivers.
System Application	Hardware and software specification as operating system administration, system hierarchy, and system architecture.
Design Model	Model map, platform for a basic framework, and identify the elements for building the system.
Technology	Access control and security, create profiles and personalization.
Network	Broadcasting, domain hosting, server connection between computer and site using internet, VPN, WAN, WAP, GPRS.
Content	Quality of text, view of list item, presentation table of content make a differently with the other site, size of image or video must be compressed to maintain the high image quality, link of item must be showing.
Methodology of Guidelines	In the back side to build the system, need user requirements of design model for the site, and the front side after finishing the model and implement in a real system, need to have a rule of using these site to help the customer for operating this site.
Service	Security account, notification, live chat as a helpdesk, plug in or add on, and search engine as a navigation for helping the customer to find some item in the site.
Interface	Font size, use a structured template to make sure all of the features in a right position, and user friendly when seeing display of site.
Aesthetic	Beauty of art from site, such as a model view, font colour, and using a colour of background.
Evaluation	These site have no bugs, and make sure all the function of features is working well.
Data Domain	Using the data storage or database for support the site with function are saving customer account, detail transaction, and search data backup.
Operational Management	Daily activities from organization very influential in business operation, such as a policy of customer member, transaction, and usually organization provide some requirement for developing the system site.
People	Customer satisfaction is important in getting some benefit when using the site.
Performance	Speeding of loading page, reducing of double click to access a site or features, doing a maintenance system in every month to make sure the system not corrupted.

TABLE IX. GENERAL COMPONENTS MAPPING TO SELECTED STUDY

Components	#Papers	Study Identifiers
Business	39	S1; S2; S4; S5; S8; S13; S14; S15; S16; S18; S19; S20; S21; S22; S23; S25; S26; S27; S28;S29;S30;S31;S33;S34;S35;S36;S37;S38; S39;S40;S41;S42;S43;S44;S45; S46; S49; S50
System Application	34	S1; S3; S5; S6; S7; S11; S14; S15; S16; S18; S21; S22; S23; S24; S25; S28; S31; S33; S34; S35; S36; S37; S38; S39; S40; S41; S42; S43; S44; S45; S46; S47; S49; S50
Design Model	28	S2; S4; S5; S6; S7; S9; S11; S12; S13; S14; S15; S17; S18; S24; S25; S26; S28; S33; S34; S36; S39; S40; S41; S44; S46; S47; S49; S50
Technology	37	S1; S4; S5; S6; S7; S8; S9; S10;S11;S13; S14;

Components	#Papers	Study Identifiers
		S16; S18; S19; S20; S21; S22; S23; S24; S25; S27; S28; S30; S31; S33; S35; S36; S37; S38; S39; S40; S41; S42; S44; S45; S47; S49;
Network	12	S14; S16; S18; S20; S21; S24; S25; S28; S31; S32; S38; S49;
Content	12	S2; S5; S10; S17; S22; S29; S34; S46; S47; S48; S49; S50
Methodology of Guidelines	9	S3; S4; S15; S17; S18; S31; S39; S44; S50
Service	28	S5; S6; S7; S10; S11; S14; S21; S23; S24;S26; S27; S28; S29; S30; S32; S33; S34; S35; S37; S38; S40; S43; S44; S46; S47; S48; S49; S50
Interface	5	S9; S16; S18; S19; S19;
Aesthetic	1	S6;
Evaluation	6	S4; S14; S26; S39; S44; S48;
Data Domain	14	S7; S14; S15; S16; S18; S21; S22; S24; S25; S28; S39; S40; S43; S44;
Operational Management	19	S5;S6; S8; S10; S14; S15; S16; S18; S20; S26; S27;S30;S35;S39;S40;S43;S47;S48; S49;
People	23	S14; S16; S18; S21; S22; S24; S25; S27; S28; S29; S30; S31; S32; S33; S37; S38; S39; S40; S46; S47; S48; S49; S50
Performance	4	S20; S29; S31; S33;

V. Conclusion

Based on Table XI, there finds 15 components of enterprise components in e-commerce and has been selected 6 components of enterprise architecture framework from Table XII which most currently used in e-commerce taken from the higher number of paper that using these components, which are Business, System, Design, Technology, Service, and People. These six components will be a basic framework to build a new development model of e-commerce system for helping the enterprises to fix business problems in implementation of framework.

VI. Limitation

This study only defines components of enterprise architecture framework in e-commerce based on systematic literature review method. It will be need validation test to verify all components can be applied in e-commerce enterprises. This study too only using specify keyword in search string to get any information focus on component of enterprise architecture framework in e-commerce.

VII. Future Research

Future work will focus on the proposed development design model of enterprise architecture framework in e-marketplace using these selected components because enterprises need the best framework that has been tested in all aspect of organization. Besides that, this study need to more explore and an added another keywords for search string in this research such as e-trade, internet marketing or mobile marketing for getting any information to build e-marketplace services system.

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